FAA-E-2335a
10 April 1972
Supersedes FAA-E-2335
dated March 7, 1968

# DEPARTMENT OF TRANSPORTATION
# FEDERAL AVIATION ADMINISTRATION SPECIFICATION

DEPARTMENT OF TRANSPORTATION

FEDERAL AVIATION ADMINISTRATION SPECIFICATION

## VIDEO MAPPING UNIT, FIVE CHANNEL

### 1. SCOPE

1.1 Scope.- The electronic equipment specified herein is a Video Mapping Unit which provides five individual mapping assemblies which may operate simultaneously and each may utilize different maps. Each mapping assembly generates analogue video which is an electronic reproduction of a correctly oriented and detailed map of an area from 10 to 250 nautical mile radius for simultaneous display with aircraft targets on ASR, ARSR, ASRDS PPI indicators and FAA Radar Bright Display Equipment used in conjunction with the associated radar system. This electronic equipment retains correct scale factors when radar range scales are expanded or off centered presentations are used. The equipment provides Air Traffic controllers with reference map data on their displays depicting airways for safe and expeditious movement of air traffic. Design features shall be incorporated in the equipment to provide for reliability and ease of maintenance during continuous operation. Modular construction and solid state design except for CRTs and photo multiplier tubes commensurate with present state-of-the-art shall be used throughout.

## 2. APPLICABLE DOCUMENTS

2.1 FAA Documents.- The following FAA specifications and standards of the issues specified in the invitation for bids or request for proposals form a part of this specification, and are applicable in their entirety unless otherwise specified herein.

| | |
|---|---|
| FAA-G-2100/1 | Electronic Equipment, General Requirements; Part 1, General Requirements for All Equipments |
| FAA-G-2100/2 | Part 2, Requirements for Equipments Employing Electron Tubes |
| FAA-G-2100/3 | Part 3, Requirements for Equipments Employing Semiconductor Devices |
| FAA-G-2100/4 | Part 4, Requirements for Equipments Employing Printed Wiring Techniques |
| FAA-G-2100/5 | Part 5, Requirements for Equipments Employing Microelectronic Devices |
| FAA-E-163b | Rack, Cabinet and Open Frame Types |
| FAA-D-2494/1 | Instruction Book Manuscripts Technical: Equipment and Systems Requirements Part 1, Preparation of Manuscript |
| FAA-D-2494/2 | Instruction Book Manuscript Technical: Equipment and Systems Requirements Part 2, Preparation of Manuscript Copy and Reproducible Art Work |

2.1.2 FAA Standards.-

| | |
|---|---|
| FAA-STD-012 | Paint Systems for Equipment |
| FAA-STD-013 | Quality Control Program Requirements |

2.2 Military Publication.- The following Military publications of the issues in effect on the date of the invitation for bids or request for proposals form a part of this specification and are applicable to the extent specified herein.

2.2.1 Military Specifications.-

| | |
|---|---|
| MIL-I-45208 | Inspection System Requirements |
| MIL-T-21038 | (SHIPS) Transformer, Pulse |
| MIL-C-3098 | Crystal Units, Quartz, General Specification For |
| MIL-E-17555 | Electronic and Electrical Equipments and Associated Repair Parts, Preparation for Delivery of |

2.2.2 Military Standards.-

| | |
|---|---|
| MIL-STD-461 | July 31, 1967 - Electromagnetic Interference Characteristics, Requirements for Equipment |
| MIL-STD-756A | Reliability Prediction |
| MIL-STD-781B | Test Levels and Accept/Reject Criteria for Reliability of Non-Expendable Electronic Equipment |
| MIL-STD-470 | Maintainability Program Requirements for Systems and Equipments |
| MIL-STD-785 | Reliability Program for Systems and Equipment Development and Production |
| MIL-HDBK/C-217A | Reliability, Stress and Failure Rate Data for Electronic Equipment |
| MIL-STD-471 | Maintainability Demonstration |

(Copies of this specification and other applicable FAA specification, standards and drawings may be obtained from the Contracting Officer in the Federal Aviation Administration Office issuing the Invitation for Bids or Request for Proposals. Requests should fully identify material desired, i.e., specification, standard, amendment and drawing numbers and dates. Requests should cite the Invitation for Bids, Request for Proposals, or the contract involved, or other use to be made of the requested material.)

(Single copies of Military specifications and standards may be obtained from Federal Aviation Administration, Washington, D. C. 20591, Attention: Contracting Officer. Request should cite the invitation for bids, request for proposals or contract for which the material is needed. Mail requests, if found acceptable, will be forwarded to a Military Supply Depot for filling; hence, ample time should be allowed.)

## 2. REQUIREMENTS

### 3.1 Definitions

3.1.1 Unit.- The word "unit" as used herein denotes a completely assembled and wired equipment which is packaged together as a physically independent entity.

3.1.2 Power Source.- The power source is defined as the available power to permit the equipment system to function when applied and is further defined in paragraph 3.4.2.

3.1.3 Maintenance Controls.- As used herein, the term maintenance control describes those adjustments requiring infrequent attention or use, or technical skill beyond that of the average operator to adjust. Such controls are not available for adjustment by the Air Traffic Control operator.

3.1.4 Reliability Definitions.

3.1.4.1 Meantime Between Failure (MTBF).- Meantime between failure is defined as the total operating time of the equipment divided by the number of failures, or as the reciprocal of unit failure rate ( $\lambda$ ).

(MTBF = $1/\lambda$ ).

3.1.4.2 Failure Rate ($\lambda$).- The average number of failures occurring per unit time in a specified time interval. It is also equal to the reciprocal of the meantime between failures.

3.1.4.3 Meantime to Restore (MTTR).- Meantime to restore is defined as the meantime to effect restoration of the unit and to put the assembly in an "up" condition; the time required to replace a failed module.

3.1.4.4 Failure.- The inability of a part to perform within previously established limits; for example, cannot be corrected by a maintenance control adjustment.

3.1.4.5 Mean Up Time (MUT).- Mean up time is defined as the mean time to failure of the unit, or set of units considered, given that the unit or set of units was "up" at time zero.

3.1.4.6 Mean Down Time (MDT).- Mean down time is defined as the mean time to effect minimum repair required of the unit, or sets of units considered, sufficient to put the function performed by that unit or set of units back "up" given that the function was down at time zero.

3.1.4.7 Per Unit Function.- Mean time to failure of the function performed by a single required unit or its backup. The per unit function MUT is the mean waiting time to the loss of the function. It is the mean waiting time to the event.

3.1.5 Types of Maintenance.-

3.1.5.1 On-Line Maintenance.- Although maintenance is generally considered as an off-line function, being performed on off-line equipments, certain operational functions related to maintenance are defined herein as on-line maintenance (e.g. calibration, visually monitoring equipment status.

3.1.5.2 Off-Line Maintenance.- The major portion of the maintenance function would generally be performed on off-line equipment. Off-line maintenance is generally classified as either scheduled maintenance or unscheduled maintenance. Scheduled maintenance includes preventive types of maintenance, routine maintenance, and corrective maintenance. Unscheduled

maintenance consists of maintenance required immediately following a failure found by the active system and which cannot be scheduled for a later time (e.g., total system failure or single equipment failure where no further redundant equipment of that type remains for the operational system).

3.2 Equipment Services and Documents to be Furnished by the Contractor.-

3.2.1 Video Mapping Unit.- The contractor shall furnish the quantity of video mapping unit specified in the contract. Any item or part necessary for proper operation of each mapping unit in accordance with the requirements of this specification shall be incorporated, even though that item or part may not be specifically provided for or described herein. All features required to meet performance requirements, such as shock mounting of particular components or assemblies, heat circulation by means of blowers, controls, indicator lamps, overload and overheat protection devices, meters, test points, etc., shall be incorporated even though the features may not be specifically provided for or described herein.

All necessary facilities, parts and hardware, including receptacles connectors, intra cabinet cabling (wiring) adaptors, and outlets shall be incorporated to enable the components of the system to be properly assembled and inter-connected as required herein. Each mapping unit shall be completed in accordance with all specification requirements and shall include the major items tabulated under subparagraphs below (all other items not listed below but required in each equipment unit for system operation as required in this specification shall also be furnished).

3.2.1.1 Deliverable Items.-

| | |
|---|---|
| Video Mapping Cabinet Unit (3.4) | 1 set |
| Video Mapping Assemblies (3.4.8) | 5 each |
| Video Map Slide Holders (3.4.8) | 7 each |
| Video Map Selector Switch (3.4.12) | 12 each |
| Kit Installation Material, including set of Special Tools (3.2.3) | 1 each |
| Test Equipment List (3.2.4) | 3 each |
| Instruction Books (3.6) | As defined in contract schedule |
| Trouble Shooting Manuals (3.7) | As defined in contract schedule |
| Installation Data (3.2.2) | 15 sets |
| Map Slide Holder Drawings (3.4.8.2.2) | 6 sets |

| | |
|---|---|
| Reliability Demonstration Option (3.9) | As defined in contract schedule |
| Test Pattern Drawings (3.4.9.1) | 6 sets |
| Reliability and Maintainability Calculations (3.8) | 1 set |

3.2.1.2 The Video Mapping Unit shall include the following:

| | |
|---|---|
| Power Supply Assembly (3.4.7) | As required |
| Video Mapping Assembly (3.4.8) | 5 each per unit |
| Map Album (3.4.9) | 1 each per unit |
| Video Map Distribution Assembly (3.4.12) | 1 each per unit |
| Video Map Selector Switch (3.4.12) | 12 each per unit |
| Map Slide Holders (3.4.8.22) | 7 each per unit |
| Maintenance Selector Switch Panel Assembly (3.4.11) | 1 each per unit |
| Meter and Test Panel Assembly (3.4.8.13) | 1 each per unit |
| Azimuth Converter Assembly (3.4.5) | 1 each per unit |

3.2.2 Installation Data.- The contractor shall furnish the Government with a general description of the video map operation, installation drawings, estimated quantities and types of interconnecting cables between equipment racks and external equipment and power sources, and estimated power requirements, space requirements, and weight of each type of equipment cabinet.

3.2.3 Installation Material.- A package of installation material shall be packed with each video mapping unit supplied under the contract. This material shall include but is not limited to mating connectors for all coaxial cable and multiconductor cable jacks, lugs, wire and cable markers and miscellaneous hardware. The mapping unit installation material package shall include all mating connectors, lugs, and wire and cable markers required for both ends of all external wires and cables. If special installation tools are required, such as crimping tools for coaxial connectors, the contractor shall furnish the Government a list of such tools.

3.2.4 Test Equipment List.- A test equipment list shall be provided to the Government prior to equipment delivery. Any special test equipment not available as "off-the-shelf" equipment but required for maintenance and alignment of the video map unit shall be provided as part of the video map unit.

3.3 Basic Design Requirements.- The prime objectives of the over-all systems design shall be the achievement of maximum operational reliability and ease of servicing. The equipment shall be designed so that all alignment adjustments and maintenance, except major overhaul of mechanical devices, and replacement of heavy parts, such as transformers, can be performed in a straight-forward manner by only one technician. To ensure maximum reliability, the contractor shall design the circuitry of the equipment around solid-state devices. Selenium rectifiers shall not be used. Each video mapping unit shall be self-contained and shall be capable of independent operation meeting all performance requirements when driven with suitable power, trigger, and azimuth synchronizing information.

3.4 Video Mapping Unit Performance Requirements.- The radar video mapper unit shall incorporate five video map assemblies (3.4.8), each capable of generating a separate video output from its own map slide transparency. Each slide transparency shall represent a different surveillance area or geographical reference point data at the various range scales. Cables and connectors to interconnect map generating modules, power supplies, and other redundant circuitry shall be furnished. Modular construction and solid state design shall be used throughout except for the flying spot scanner CRT, and photomultiplier tubes. With the exception of each video mapper assembly the remainder of the circuitry shall be redundant. No common equipment or common circuit paths shall be incorporated into the design which, if they failed or were disabled for maintenance, would cause more than one mapper output or PPI position to fail, unless the common equipment or circuit path is also backed up by a duplicate equipment or path which shall be provided and designed to automatically sense a failure and switch into operation. Visual indication of an automatic transfer shall be provided on the equipment, and on the Video Map Selector Switch (3.4.12) designed for remote installation by the Government. A reset switch shall be provided for each redundant circuit so that upon correction of the failed module it may be put back into operation. Input power switches, fuses, and such circuit parts that are required for automatic failure sensing and switching are exceptions to this requirement. Furthermore, no parallel connected circuit path shall be incorporated which, if shorted, would cause more than one map output to fail.

Each radar video mapper unit shall have high voltage power supplies designed such that high voltage shall be removable from any map assembly up to two (2) without interruption of operation in any of the remaining map assemblies. Provisions for complete isolation of the high voltage power supplies so that any power supply can be worked on without having high voltage present is required.

If two high voltage power supplies are provided, provisions shall be made for automatic switch over from the main to the auxiliary power supply in case of failure in the main high voltage power supply. The main and auxiliary power supplies shall be identical. A warning device in the form of a light shall be provided to indicate a failure in either high voltage power supply. All power supplies (high and low voltage) shall be self-protecting so that a continuous short circuit across the power supply output will not damage circuit components and the output voltage will return to normal upon removal of the short circuit.

Provision shall be made within the video mapper unit to align completely with operational requirements of any map assembly without the use of special external test equipment. Each map assembly shall be aligned or repaired without causing interruption of service to the remaining assemblies. All alignment shall be accomplished without removing the map assembly from the video map unit. The equipment shall return to normal operation within 4 seconds after a primary power failure of 15 seconds or less.

3.4.1 Service Conditions and Requirements.- The service condition shall be as specified in paragraph 1-3.2.23 of FAA-G-2100/1; AC line parameter (120 V), 102V to 138V (± 1 volt); and ambient conditions for Environment I.

3.4.2 Power Source.- The equipment shall operate from the following A.C. line power sources: 120V, single phase, three wire, 60 Hz.

3.4.3 Video Mapping Unit Construction

3.4.3.1 Cabinet Construction.- The cabinet construction shall be in accordance with FAA-E-163b. The cabinet shall be constructed of metal (steel or non-ferrous) and shall contain all of the major units required mounted modularly. Provisions shall be incorporated for bolting the cabinet to the floor. The design shall provide maximum accessibility for maintenance and repair of units, components and circuits. Each chassis/assembly/subassembly shall be removable from the cabinet without requiring the partial or complete removal of any adjacent chassis/assembly from the cabinet. Partial is defined as any removal of wires, components, cables that would affect normal operation.

3.4.3.2 Physical Dimensions.- The following dimensions shall not be exceeded:

| | |
|---|---|
| Height | 72 inches |
| Width | 28 inches |
| Depth | 26 inches |

The total weight shall not exceed 350 pounds.

3.4.3.3 Ventilation.- The cabinet shall contain blower motor/s and fan/s for adequate forced air ventilation in accordance with FAA-G-2100/1 if required and the forced air exhausted through louvers in the front and back sides and top of the cabinet.

3.4.3.4 AC Service Receptacles.- The cabinet shall contain 2 each 120 volt convenience outlets, one located on the front exterior and one on the rear exterior. The AC power service receptacles shall be in accordance with paragraph 1-3.6.4 of Specification FAA-G-2100/1.

3.4.3.5 System Grounding.- A common system grounding design criterion shall be used for all units to be delivered under this specification. The grounding design must be compatible with other equipment with which this system may interface. Line filters, if used, shall not introduce currents in the grounding system. The grounding design shall contain three discrete ground busses:

a. One that bonds together all cabinets and frames.
b. One that connects all signal return wires together.
c. One that connects all power grounds together.

The cabinet/frames (a) and the signal return (b) ground busses shall be isolated from the power ground (c) and also isolated from building (earth) ground except that both busses (a) and (b) are to be connected to the

building ground at one common connection point. Signal return paths for signals that pass between units shall use the shield of the coaxial cable, or a separate signal return wire shall be provided for each path if coaxial cable is not required. The power grounding system (c) shall be separate from the other two busses. All internal equipment ground wires shall be at least #20 AWG stranded. The portions of ground busses (a) and (c) external to equipment cabinets shall be at least #6 AWG stranded copper.

3.4.3.6 Wire and Cable Protection.- All individual wires and cables subject to chafing or abrasion shall be suitably protected; this protection shall be independent of the individual wire or cable insulation or jacket. This requirement is in addition to the requirements of 1-3.10.7, FAA-G-2100/1, and does not relieve the contractor from compliance with 1-3.10.7.

3.4.3.7 Overheat Warning Device.- Each video mapping unit cabinet shall incorporate a thermal sensing device which will activate a conspicuously located overheat warning light when the temperature within the enclosure has risen above a safe operating limit.

3.4.3.8 Packaging.- The basic packaging concept of the equipment shall be modular plug-in cards or small plug-in assemblies. This does not relieve any other requirements, e.g., RFI integrity, operation under environmental conditions, reliability, system performance, system capability, functional capability, and accessability. It is realized that portions of the system are not amenable to this type of modular construction. Cabinet layout and modular configuration shall be subject to Government approval.

3.4.3.9 Modular Concept.- The configuration of the modular assemblies shall be based on one of the following options:

(a) Standard rack mounting assemblies mounted on chassis/slideout drawers. Drawer slides shall be a heavy-duty locking type for securing the panel assembly in either the normal or extended position. In the extended position, slides shall permit pivoting the assembly through $\pm$ 90 degrees from its normal operating position. Printed circuit (PC) plug-in modules shall be mounted vertically in PC card racks.

(b) Standard rack mounting assemblies with shelf-mounted modules that plug into a front panel/chassis assembly. Spot welding may be used in lieu of screws and nuts in the sheet metal manufacture and assembly of module shelf and plug-in modules where it is not detrimental to the operation or maintenance of the equipment.

3.4.3.10 Plug-in Modules.- Plug-in shelf modules and plug-in printed-circuit card modules shall be designed for mounting in the associated panel assembly. Shelf-mounted modules shall have a metal chassis or other suitable framework to provide a solid component mounting structure with adequate protection for printed wiring and small components when inserting, removing or during handling of modules when they are removed from their mounting assembly.

Modules of a given type shall be mechanically and electrically interchangeable. Each type module shall be keyed or identified with its assembly or PC card rack location to prevent improper insertion in an assembly.

3.4.3.11 Plug-in Mounting.- Shelf-mounted modules and PC card modules shall be mounted side-by-side, bookcase style, in an assembly, and shall be equipped with chassis guide strips, or rails, or both and mating connectors, etc., as are necessary to ensure positive circuit connections of the module with its mating assembly receptacle. Quick acting fasteners shall securely lock front panel type of plug-in modules in place in their operating position. Each printed-circuit board and card shall include identification markings which identify the basic circuit function and the type number of the assembly of which it is a part.

3.4.3.12 Printed-Circuit Board Supports.- All boards shall be supported within one inch of the edge on at least two edges not including the edge with the connector. Support shall be provided to prevent fracture or loosening of the foil due to flexing the board.

3.4.3.13 Printed Circuit Board Wiring/Connectors.- All printed circuit board wiring/connectors shall be in accordance with FAA-G-2100/4 and MIL-STD-275.

3.4.3.14 Printed-Circuit Board Removal.- All printed-circuit boards shall include a convenient means for aiding maintenance personnel in grasping the board for removal from its mounting. This may consist of a special handle, cut out reinforced for finger holds or similar means. A special removal tool shall not be required. The method used by the contractor shall permit easy removal of the board without damage or undue strain of the board or any component mounted thereon.

3.4.3.15 Reserve Card Capacity.- Reserve circuit card capacity shall be provided to accommodate 10% more cards in each bin than the equipment requires, with a minimum of one for each bin.

3.4.3.16 Printed-Circuit Board Extender.- With each equipment, there shall be supplied a printed-circuit board "extender". An extender consists of a printed-circuit board (not keyed in order to permit insertion into any connector) provided with printed circuitry to extend all plug input points across the board to a receptacle on the opposite end, into which receptacle a removed printed-circuit board can be plugged. The extender board thus provides an accessible active operating position for any printed-circuit board normally inaccessible for ready maintenance and test while within the card cage. The extender shall be furnished installed in a spare blank printed-circuit board receptacle position provided for that purpose or stored within the equipment.

3.4.3.17 Front Panel Connectors and Cables.- Front panel connectors and cables shall be limited to those required for testing or in cases where it is not feasible to route signals through rear connectors. Suc cases shall require specific Government approval.

3.4.3.18 Test Points.- Test points shall be provided for measurement and observation of all voltage and waveforms needed for checking of performance and for maintenance of individual units. Except where the functioning of circuits would be adversely affected by long leads, test points shall be accessible on the front panels or immediately behind the access doors of all units. Test points necessary for frequent alignment and adjustment purposes shall be provided at the front of plug-in cards and modules and shall be accessible without a card extender. Test points for waveforms shall be provided with jacks suitable for use with oscilloscope test leads. Tip jacks shall be provided for the measurement of voltages, with red tip for positive potentials, violet tip jacks negative potentials, and black tip jacks for ground. All test points shall be identified with a TP number; and the voltage value, signal waveform, or descriptive title (if voltage value or waveform would not be particularly significant) shall be indicated adjacent thereto, as well as on each schematic diagram. Only descriptive titles or voltage values shall be shown for test points on exterior front panels. All test points shall be readily accessible through door openings or other acceptable means. Suitable plastic cards may be used to illustrate interior waveforms where the specified methods of interior marking or space limitations are impractical. The equipment shall be designed to provide for connections for such test equipment as may be required for its expeditious maintenance, calibration and repair. All test points shall be readily accessible with adequate clearance and visibility when plug-in extension units are in position. Connection of normally used test equipment to any test point shall in no way affect system performance.

3.4.3.19 Vertical Rack Panels.- Units utilizing vertically mounted rack panels shall require specific Government approval. Such units shall meet the following general requirements. Components such as transformers, reactors, large cased capacitors and meters, shall be mounted on the front surface of the rack panels; all small components, wiring terminal boards, and terminal blocks, shall be mounted on the rear surface of the rack panels. Subject to Government approval, connectors and their associated short lengths of cable may be mounted on the front panels. Handles shall be provided on the front surface of each rack panel to facilitate its removal from the cabinet, and to provide adequate protection against damage to front surface mounted components when the rack panel unit is placed on a bench, front surface down, for maintenance and repair. All surfaces of items on the front of panels shall be at ground potential, or shall be insulated adequately from ground and protected properly to prevent accidental contact if the potentials are other than ground potential.

3.4.3.20 Transistors and Semiconductor Devices.- Transistors and seimconductor devices shall be in accordance with FAA-G-2100/3.

3.4.3.21 Integrated Circuits.- Solid-state microelectronic devices shall be in accordance with FAA-G-2100/5 and MIL-STD-883.

3.4.3.22 Relays.- Each relay shall have coil data (resistance, pick-up voltage, drop-out voltage, operating voltage) marked on the cover in addition to the diagram specified in 1-3.16.8.7, FAA-G-2100/1. All relays

shall be of the plug-in type and have individual hold-down clamp or be affixed to the chassis/panel. Each DC relay coil shall have a suitable damping diode or other device to eliminate transients.

3.4.3.23 Terminal Blocks and Connectors.- Each card bin, vertical chassis, and cabinet shall be equipped with connectors or barrier type terminal blocks for the termination of inter-unit and inter-cabinet cabling. Terminal blocks shall be mounted vertically inside the rear door of cabinets. The terminals of all terminal blocks shall be covered with removable clear plastic strip barriers having round access holes in line with each terminal to permit the insertion of a screwdriver blade or test probe. Suitable clamps shall be provided for each cable group.

3.4.3.24 Location of Controls.- Frequently used controls on plug-in modules shall be accessible without removal of the module from its normal position. Controls on units using vertical panel construction shall be on the front surface of the panel of the unit with which the control is associated. Controls for horizontal chassis units shall be mounted in front panels or immediately behind front access panel doors of each unit. All controls, adjustments and test points shall be mounted so as to minimize the possibility of personnel coming in contact with high voltages or components operating at high temperatures.

3.4.3.25 Radiation Interference and Susceptibility.- The equipment shall meet the requirements of MIL-STD-461 Class IC from 30 Hz to 300 MHz.

3.4.4 Power Distribution/Controls.- The distribution/controls shall be located on the exterior of the Mapping Unit Cabinet and shall contain power switches, circuit breakers and/or fuses and controls. It shall be the contractor's option to combine all power switches, circuit breakers and/or fuses and controls on one distribution/control panel providing that the controls do not interact with each other.

3.4.5 Azimuth Converter.- The equipment shall be designed to operate when receiving synchro azimuth data or digital azimuth data. Conversion to operate from one type input to the other shall be made by interchanging printed circuit boards within the video mapper. Space shall be provided within the video map unit to store the unused printed circuit cards. The types of data input are specified below.

3.4.5.1 ACP/ARP Sine-consive Converter.- The mapper shall contain an ACP/ARP to sine-consine converter to interface with radars providing digital azimuth information to indicate antenna position. The converter shall be redundant. Upon failure, the mapper shall be automatically switched over to the backup converter in no more than one revolution of the radar antenna. It shall be possible to remove and repair the converter module that has failed without affecting the operation of the mapper. The ACP/ARP input impedance to the converter shall be greater than 5,000 ohms. The option of bridging or terminating the BNC inputs to the converter with a 75 ohm load shall be provided. Provisions shall be provided to compensate for displacement of the ARP pulse to $\pm$ 180° with $\pm$ 6 minutes from antenna north position.

The characteristics of the ACP/ARP input pulses are as follows:

| | | |
|---|---|---|
| a. | Azimuth Change Pulses (ACP) | 4096 pulses per 360° of antenna rotation equally spaced over 360° * |
| b. | ACP pulse-to-pulse jitter | ± 10% of nominal spacing |
| c. | Azimuth Reference Pulse (ARP) (on separate line from ACP) | One pulse from every 360° of antenna rotation |
| d. | ARP position | One each antenna rotation position, midway between two ACP's |
| e. | ARP jitter | ± 20% of ACP spacing |
| f. | Impedance (design center) | 75 ohm |
| g. | Logic level "0" | 0 to 0.5 volts DC |
| h. | Logic level "1" | 5.0 ± 1.0 volts DC (positive going) |
| i. | Pulse width | 23 ± 3.0 microseconds |
| j. | Pulse rise time | 1.0 microsecond maximum |
| k. | Pulse decay time | 1.0 microsecond maximum |
| l. | Antenna rotation speed | 3 rpm to 18 rpm |

*Nominally, pulses fall at equal intervals; however, under certain conditions such as antenna wind loading pulse-to-pulse time variations can be expected. The reference pulse occurs midway between two of the equally spaced azimuth pulses.

3.4.5.2 Synchro/Sine-Cosine Converter.- The mapper shall contain a synchro to sine-cosine converter to interface with radars providing synchro azimuth information to indicate antenna position. The converter shall be redundant. Upon failure, the mapper shall be capable of switching over to the back-up converter in no more than one revolution of the radar antenna. It shall be possible to remove and repair the module that has failed without affecting the operation of the mapper. The synchro to sine-cosine mapper shall be of solid-state design capable of operating on the 1 X speed only input information and maintaining azimuth accuracy requirements. The servo error that is introduced by the video map servo system shall not exceed ± one-quarter of a degree of antenna rotation position. Low pass filter design shall not cause greater than 0.05% diameter visible AC ripple effect as viewed on the PPI. The synchro input characteristics are as follows:

| | | |
|---|---|---|
| a. | Reference voltage (R1, R2) | 105-130 volts, 60 Hz |
| b. | Input, line to line (S1, S2, S3) | 90 volts ± 10%, 60 Hz |

| | | |
|---|---|---|
| c. | System type | one speed and 10 speed<br>one speed and 36 speed |
| d. | Antenna rotation speed | |
| d. | Antenna rotation speed | 3 rpm to 18 rpm |

3.4.6 Trigger Inputs from Associated Radar Systems

3.4.6.1 ASR Radar Sixty Mile Range.- Either of two different types of trigger mode timing will be encountered as specified below:

(a) Non-staggered mode: Triggers will occur at regular time intervals within the approximate range of 667 microseconds to 1429 microseconds, as determined by operation of the associated radar on a single PRF within the range of 700 to 1500 pulses per second.

(b) Staggered mode: Triggers will occur at irregular time intervals, each interval within the approximate range of 833 to 1429 microseconds, as determined by random sequential, repetitive operation of the associated radar on up to six discrete PRFs within the range of 700 to 1200 pulses per second.

Performance of the video mapper shall be in accordance with all requirements specified herein for both (a) and (b) above. Sweep countdown whall not occur for triggers within the range of 700 to 1500 pulses per second. Limiting of the maximum range to less than 60 nautical miles shall occur at trigger PRFs in excess of 1200 pulses per second. In either the staggered or unstaggered mode, radar video will be in time synchronization with the triggers.

3.4.6.2 ARSR Radar 200 Mile Range.- Triggers will occur at regular time intervals within the approximate range of 2500 microseconds to 4166 microseconds, as determined by operation of the associated radar on a single PRF within the range of 240 to 400 pulses per second.

3.4.6.3 Trigger Input Signals.- The mapper shall operate from synchronizing input signals having the following characteristics:

Radar trigger (pre-trigger)

| | | |
|---|---|---|
| 1. | Amplitude | 3 to 75 volts peak positive |
| 2. | Width | .5 to 6.5 microsecond |
| 3. | Rise time | .1 to .5 microsecond |
| 4. | Fall time | .1 to .2 microsecond |
| 5. | Jitter | 60 nanseconds |
| 6. | Impedance | 75 ohms coaxial line |
| 7. | Pre-trigger time | 10-120 microseconds before radar zero time (3.4.6.1) |
| 8. | Trigger time | zero range time (3.4.6.2) |

Pretrigger adjustment shall be provided to each mapper unit so that the timing of the video for each mapper assembly will be time coincident. With the pretrigger input all map assemblies shall simultaneously meet the requirements as specified in paragraph 3.4.8.9.

3.4.7 Power Supplies.- Individual power supplies shall be provided to maintain the outputs within limits without degradation of Video Mapper performance when the primary source is varied over the range specified in paragraph 3.4.1.

3.4.7.1 Power Supply Regulation.- All power supplies shall be electronically regulated to maintain output voltage to within 1% of the nominal value or as required to meet specification requirements as the load is varied from 40% less than to 20% more than the normal load, and as the line voltage is varied between the service condition limits.

3.4.7.2 Ripple Voltages.- Ripple voltages are defined as the peak-to-peak value of a simple or complex waveform consisting of power line frequency components and harmonics thereof, and synchronous or repetitive non-synchronous transients. The ripple voltage of all power supplies shall be such that all specification requirements are fulfilled and further reduction of the ripple voltage would not result in any significant improvement in the stability of operation, circuit control adjustments, or indicator presentation.

3.4.7.3 Cathode-Ray Tube (CRT) Power Supplies.- The regulation of all CRT power supplies, including anode, grid, and focus supply voltages, shall be such that no perceptible defocusing or change of intensity shall occur when the line voltage is varied through the service condition limits. Sweep drive voltages to the CRT shall be adjustable to provide optimum performance. The CRT high-voltage power supply shall be regulated to plus or minus 1 percent. The power supplies for the flying-spot scanner tubes shall be such that no perceptible defocusing or change of intensity shall occur when the line voltage is varied through the service condition limits. Sweep drive voltages to the CRT shall be adjustable to provide optimum performance. Flyback type power supplies for the flying-spot scanner tubes shall be prohibited.

3.4.7.4 Failure Protective Circuits.- Provision shall be made to protect circuit components in the event of failure. Upon failure of any bias supply or system trigger, all voltages which could cause damage or degradation to the mapper units shall be automatically reduced or switched off.

3.4.7.5 Power Supply Indicators.- Each circuit protected by a fuse or circuit breaker shall have an indicator lamp which shall be illuminated when the fuse or circuit breaker is open. Neon indicator lamps shall be used wherever possible. All indicator lamps shall be uniformly located with respect to their associated fuse or circuit breaker, or they may be an integral part of the fuse holder. Fuses shall be in accordance with FAA-G-2100/1, paragraph 1-3.7.3.

3.4.7.6 Short Circuit Protection.- All power supplies shall be self-protecting such that without the use of fuses, circuit breakers or other protective devices, a continuous short across the power supply output will not damage circuit parts and the output voltage will return to normal upon removal of the short circuit.

3.4.8 Video Mapper Assembly

3.4.8.1 Map Generation.- The flying spot scanning principle shall be employed to generate map video from a slide transparency. The map scanner shall employ no lenses or mirrors and no moving parts such as rotating deflection coils, slides, etc. The slide gate shall be of simple mechanical design (no slide magazine). Slide changing in the gate shall be manual. Electrical voltage adjustments shall be provided to quickly center, expand or reduce the sweep of the scanner to correct for scale and positioning inaccuracies of the background image on the slide. Mechanical adjustments shall be provided to adjust the azimuth orientation of the slide in the gate of the scanner.

3.4.8.2 Map Slide.- The map slide shall consist of a map transparancy (3.4.8.2.1) mounted on a glass with integral emulsion or a photoplast plate. The map slide shall be easily mounted to a slide holder (3.4.8.2.2) which is inserted and positioned in the video map unit. The map slide shall be provided by the Government. It shall have a useful diameter of at least 2 inches, but not more than 3 inches.

3.4.8.2.1 Map Transparency.- The video mapper shall be capable of operating with map transparency films that are commercially available such as Dupont Litho COS-4 and Kodalith 7000. These films have a high resolution (400 lines/cm), high contrast emulsion or a chromar or mylar base with a nominal thickness of 7 mils.

3.4.8.2.2 Map Slide Holder.- The map slide holder shall be designed such that the map slide (3.4.8.2) can be mounted, positioned, replaced by maintenance personnel and inserted into the video map unit and positioned to an accuracy of .1 percent. The map slide holder shall have horizontal and vertical registration marks which are visible when the map slide and transparency are mounted. The map slide holder drawings shall be submitted for Government approval. Seven (7) each map holders shall be furnished with each video map unit.

3.4.8.3 Deflection Yoke.- A fixed deflection yoke for principal sweep and position deflection shall be used for the video mapper. The deflection yoke shall incorporate a two-axis magnetic coil with sufficient accuracy to meet the system accuracy requirements.

Each axis of the deflection yoke shall be driven by an amplifier whose power handling capacity shall be 200 percent of that normally required for full sweep range of the associated slide transparency. All deflection circuitry and components shall have response and recovery characteristics that are sufficient to meet the accuracy and other requirements of the mapper. Sweep recovery time of the electron beam to 0.1 percent of the CRT diameter shall not exceed 60 microseconds from a maximum use condition, e.g., a 60 mile sweep and a PRF of 1200.

3.4.8.4 Scanner Tube Protection.- Automatic circuits shall be provided to prevent damage to the flying-spot scanner tube when:

a. The antenna is stopped at same angle for one hour.
b. The sweep inputs or deflection fails for one hour.
c. No degradation in performance shall result when the above occurs.

3.4.8.5 Video Amplifiers.- The video amplifiers shall include provisions for receiving and producing positive video output pulses of adjustable amplitude over the range of 0 to 4 volts when terminated with 75 ohms. The video outputs shall be automatically compensated with range to provide a steady increase with radius within the display area to provide the necessary compensation for the detrimental effects caused by the angular velocity of the sweep of the radar display and shall provide for a uniform intensity of the map video on the radar display. The overall system video bandwidth shall be four (4) megahertz and shall not deviate by more than $\pm$ 1 db from the response at 100 KHz.

The rise time of video pulses shall not exceed 0.125 microseconds as measured between the 10% and 90% points on a 5 microseconds pulse having a PRF of 10,000 pps. The percent of droop excluding "over shoot" and "under shoot", shall not exceed 5% as measured on a 1,000 microsecond pulse.

3.4.8.6 Video Output Signal.- Five independent output signals shall be provided, each corresponding to a separate video map assembly. The output white video level shall be adjustable from zero to plus 4 v peak measured at the end of a properly terminated (75 ohm) coaxial cable up to 300 feet in length by convenient screwdriver adjustments.

3.4.8.7 Automatic Gain Control Circuits.- Automatic Gain Control Circuits shall be incorporated to minimize excess brilliance (blooming) at the center of the PPI screen caused by overlapping of scan lines and to improve resolution. Regulated voltages shall be provided for the AGC circuit. An ON-OFF switch for the AGC circuit shall be provided on the maintenance selector switch panel (3.4.11).

3.4.8.8 Distortion.- The resultant video map shall be an accurate reproduction of the original map within the distortion limits specified herein.

3.4.8.9 Accuracy.- The accuracy shall be 0.4 percent point registration based on the full range of the display diameter and the accuracy between groups of data separated by a distance equal to 0.1 diameter shall not exceed 0.1 percent. It shall be such that any coordinate point generated from a slide transparency shall be within 1.0 percent of the scan radius with respect to the position of the same coordinate point on the slide transparency.

3.4.8.10 Map Range.- The area covered by the map shall be a circle. The electronic mapping group shall be capable of being used in a centered mode with radar systems having indicators with sweeps from 10 to 250 nautical miles. The video channel ranges shall be 10, 20, 30, 40, 60, 100 and 200 nautical miles. Each range shall be adjustable by $\pm$ 25 percent. Map signals shall not appear on the indicator at a range greater than the radius of the map which is in use at the time.

3.4.8.11 Map Detail

3.4.8.11.1 Resolution and Linearity.- The video mapper shall have a minimum resolution capability of 150 range rings on a radius of a 16-inch CRT (7.5 inches effective) regardless of range setting. The end resolution shall be defined as obtaining at least 50 percent video modulation as measured on an "A" scope by using the resolution test slide (3.4.9.1). It shall be possible to obtain this resolution (modulation) at all sweep speed rates required to obtain the 10-mile to 250-mile range. Sweep to sweep jitter shall not exceed $\pm$ 0.05 percent of sweep radius as determined at any point along the sweep at any azimuth position. It shall resolve on all ranges and for all video output voltage adjustments between one and three volts, a test pattern having the following characteristics at any point on the pattern:

a. Alternating clear and dark areas, in range, that are 1/300 $\pm$ 10 percent of the scan radius.

b. Line widths that vary in size from 1/300 to the full radius.

c. Film densities that are within 0.2 to 2.

It shall be designed so that two constant amplitude levels (corresponding to video black and video white) of output signals are generated. While scanning the test slide, the time duration of the output video signals measured at the 50 percent amplitude level shall not differ by more than 0.1% from the calculated time duration for the electron beam to scan across any line width. The output video white level voltage shall not vary by more than 5 percent of the nominal output voltage setting and the black level signal voltage shall be 0 $\pm$ .2 volts. The signal to noise ratio shall be greater than 30 db.

3.4.8.12 Photomultiplier Tube.- Separate photomultiplier tubes shall be provided to change light impulses to electric impulses for application to the Video Amplifier.

3.4.8.13 Meter and Test Panel.- One meter and test panel shall be provided to allow convenient measurement of parameters of video mappers with external and internal test equipment. All waveforms as specified in paragraph 3.4.8.14 shall be selectable at the outputs of the test panel. The regulated power supply voltages shall be selectable for monitoring by the meter. It shall be the contractor's option to combine the meter and test panel and the distribution control panel into one panel.

3.4.8.14 Switch Selection of Monitored Functions.- The following functions, as a minimum, shall be obtained by multiple switch selection from each of the five mapper assemblies to a BNC type coaxial receptacle or test point on the meter and test panel:

1. Off position.
2. Output of Video Amplifier (each module).
3. Trigger/Pretrigger Outputs.

4. Outputs of Sin/Cos Converter (ACP/ARP and/or Synchro).
5. High Voltage Power Supplies.
6. Low Voltage Power Supplies.
7. Spare.

A switching device shall be included to enable selection of input through cable connections or test leads.

3.4.9 Map Album.- A map album shall be furnished as part of the video map unit by the contractor for the storage of mounted map slides. The map album shall contain provisions for storing up to twelve (12) mounted slides and slide holders.

3.4.9.1 Test Pattern Transparencies.-The contractor shall design test pattern drawings that demonstrate the requirments of paragraph 3.4.8.11. The test pattern drawings shall be submitted to the Government for review and approval. The Government shall furnish the contractor linearity and resolution test pattern transparency map slides for demonstration for conformance to specification requirements. The test pattern transparency map shall be used for visual evaluation of linearity and resolution when presentation is made on a PPI display. The quantity and time of delivery of the test slides to the contractor shall be as required in the contract.

3.4.10 Controls.- The contractor shall wire in all control wires and cables to the appropriate plugs and terminal boards to achieve operation as follows:

1. When the main power ON-OFF switch on the associated video map unit is in the ON position, the preheat voltages shall be applied to the mapping assemblies and the preheat relays shall begin their cycles.

2. If high voltage control for each map is remoted in each PPI console position, the selector switch shall contain a no control light and a "no select" feature for each map assembly when that assembly is being utilized for maintenance.

3. If high voltage control for each map module is not remoted to each PPI console position, the selector switch shall contain a no control light to indicate the map module is being used for maintenance.

3.4.11 Maintenance Selector Switch Panel.- Local maintenance circuitry, located within the maintenance selector switch panel shall be incorporated to provide the following:

1. Main Power ON/OFF Switch
2. High Voltage ON/OFF Switch
3. AGC ON/OFF Switch
4. Video Map Assy ON/OFF Switch
5. Overvoltage Alarm
6. Fuses
7. Redundancy Failure Lights

3.4.12 Video Map Distribution Assembly.- The distribution assembly shall be capable of remotely switching the output of any one or all of five video mapper assemblies to up to 12 displays. The video from any combination of map assemblies shall be non-additively mixed. Each display has a 75 ohm impedance video map input. The video mapper cabinet may be located up to 300 feet from the displays. Proper impedance matching shall be maintained throughout the mapper and switching circuitry so that from one to twelve display consoles may be connected in varying selections and quantities to the five video map assemblies. The type of transmission line shall be RG-59U cable with BNC connectors. Isolation between video mapper channels shall be at least 40 db and switching shall cause no transients or flashing on the displays. Each video map distribution assembly shall consist of map selector/driver cards, and a map distribution panel designed to drive up to 12 PPI displays including all wiring and cable terminations required for the map delector switches. Upon failure of one of the 12 channel outputs, repair shall be accomplished without interruption of the remaining eleven channels.

The map selector switch shall use push buttons with a suitable indicator to show which map assemblies are selected. The remote control box shall be enclosed in a box which is no larger than 6 inches high by 4 inches wide by 6 inches deep. A dimmer switch shall be provided to control the intensity of the lighting from zero to maximum. The control box shall be designed to be mounted as an accessory box on a PPI console or in an adjacent 3/16 inch thick front panel. Hardware for either type of mounting shall be provided. It shall be designed for connection remotely via GFE control cable to a map selector/driver card outputs so that any one or all of the five video mapper output channels may be selected for display on the console to which the particular map selection switch is installed. Each map selector/driver card shall use solid state switching and include suitable isolation between any of the five mapper channels and the map sleector/driver output. The card output shall include a 75 ohm line driver which has an adjustable output of one to four volts $\pm$ 1 volt of map video.

The map selector/driver cards and the map distribution panel shall be installed in the video mapper equipment cabinet. The electrical and mechanical design of the Video Map Distribution Assembly shall permit one or more map selector/driver cards to be easily removed and replaced while the entire remaining equipment is in operation. The removal of one or more cards shall not affect the video map voltage levels or the impedance matching of the cards and video map units that are operating. The contractor shall furnish one distribution assembly with each video map cabinet.

3.5 Special Tools.- The need for special tools and test equipment for adjustment and servicing of the equipment shall be minimized. If required, the special tools shall be furnished and located within the cabinet in a conveniently accessible location. Special tools are those tools not readily available on the open market such as spanner wrenches, tuning wands, and alignment bars. The contractor shall submit a list of special tools to the Contracting Officer or his designated representative for approval prior to delivery.

3.6 Instruction Books.- Instruction books shall be in accordance with Specification FAA-D-2494/1 and /2. Quantity shall be as specified in the contract schedule.

3.7 Trouble-Shooting Manuals.- Trouble-shooting manuals shall be supplied in accordance with the requirements of the following subparagraphs. The quantity and disposition of the manuals shall be as specified in the contract schedule.

3.7.1 Purpose and Scope of Manual.- This book shall contain all diagrams and illustrations necessary for the isolation and repair of troubles within the video mapper system. It shall be designed for convenient use by maintenance technicians and shall not contain detailed narrative information. It shall contain copies of the schematic diagrams and system cabling diagrams which are incorporated in the instruction book. In addition, it shall contain simplified, enlarged diagrams of functions designed to aid in the rapid isolation and correction of troubles within the system. Such simplified diagrams shall show separately, in skeleton form, the complete circuitry of such functions as video, trigger, etc., showing all test points in each circuit with the proper waveform and amplitude for each test point. Separate wiring diagrams, in skeleton form, shall show and identify each plug, pin, terminal strip, meter, test point, switch, relay, etc., for the following circuits: ac power distribution, filament supply distribution, dc voltage supply distribution, metering, control functions and other circuits decided upon by mutual agreement between the Government and the contractor. All diagrams shall be arranged to permit simple, straightforward tracing, with functions and directions of travel clearly indicated.

3.7.2 Construction and Binding.- The troubleshooting manual shall be designed so that the book can be opened to any desired page and folded back upon itself so as to lie flat for easy reference during maintenance use. A multiring binding (holes on 1/2" to 3/4" centers) shall be utilized and shall be subject to the approval of the Government. Covers shall be stiff and durable and shall be made of cloth-covered cardboard or of laminated plastic to permit the book to be folded in a vertical position so as to be self-supporting with the selected pages nearly vertical. All diagrams shall be flat and not folded. All diagrams shall be on ledger paper, white 100% rag content. The scale of schematic and system cabling diagrams shall be at least as great as that used in the instruction books. Diagrams shall be printed on only one side of the sheets.

3.8 Reliability and Maintainability.- The specified MTBF for the video mapper system shall be 10,000 hours. Success requires that four of the five mapper assemblies provide outputs within operational tolerances to nine of the twelve displays. For reliability demonstration purposes, a specified mean time between maintenance action (MTBMA) for the video map unit shall not be less than 1,000 hours. A mean maintenance action of any type shall not exceed 30 minutes, exclusive of the CRT and PMT which shall not exceed two hours. The contractor shall submit MTBF and MTTR predictions and calculations for the equipment to be delivered. Reliability and maintainability predictions shall utilize the program and techniques of MIL-STD-756A (785,470) and MIL-HDBK-217A. The MTTR shall not exceed .5 hours.

3.9 Reliability Demonstration Option.- A reliability demonstration shall be conducted in accordance with test Plan V Test level A-1 (MIL-STD-781B) on the equipment specified herein. The number of test units to be used for the reliability demonstration shall be as specified in "Recommended Sample Size" of paragraph 4.2.3.1 of MIL-STD-781B.

3.10 Extension Cables.- Extension cables and connectors shall be provided so that any module can have normal voltages and signals applied to it for maintenance purposes when removed from the cabinet or chassis.

3.11 Crystals and Pulse Transformers.- Crystal units shall be designed and manufactured to meet the requirements of MIL-C-3098. Pulse transformers shall be designed and manufactured to meet the requirement of MIL-T-21038.

## 4. QUALITY ASSURANCE PROVISIONS.

4.1 General.- Quality assurance provisions shall be as specified in Section 1-4 of Specification FAA-G-2100/1 and FAA-STD-013a. Except where otherwise specified, all tests shall be performed under normal test conditions as defined in paragraph 1-3.2.22 of FAA-G-2100/1.

4.2 Factory Inspections and Tests.- The inspections and tests listed in the subparagraphs hereunder shall be performed at the contractor's plant by the contractor and may be witnessed by the Government.

4.2.1 Unit Production Inspection/Test.- Each unit (unit is defined in paragraph 3.1.1 of this specification) shall be given a complete mechanical/visual inspection by the contractor to assure conformance to all contract and specification requirements. Proposed test procedures and test data sheets for unit production inspection/test shall be submitted to the Government for approval in accordance with paragraphs 2.2.1, 2.2.2, and 2.3 of FAA-STD-013a.

4.2.2 System Test.- Systems will be tested in accordance with the following subparagraphs:

4.2.2.1 Design Qualification Tests.- Design qualification tests shall be those required by this specification marked (*) under 4.2.2.4, Specific Tests, and those required by paragraph 1-4.3.2 of FAA-G-2100/1.

4.2.2 Type Tests.- Type tests shall be performed under the specified service and environmental conditions in accordance with FAA-G-2100/1. Type tests are those marked (%) under 4.2.2.4, Specific Tests.

4.2.2.3 Production Tests.- Production tests shall be performed in accordance with FAA-G-2100/1 and consist of those tests marked (#) under 4.2.2.4, Specific Tests.

4.2.2.4 Specific Tests.- The following listed tests shall be performed as specified above.

| Test | | | | Specification Paragraph |
|---|---|---|---|---|
| (a) Design and performance requirements | | | | |
| AC power interruption | (*) | (%) | (#) | 3.4 |
| (b) Service conditions and requirements | | | | |
| | | | | 3.4.1 |
| AC line power source | | (%) | | 3.4.2 |
| (c) Construction | | | | |
| Rigidity | (*) | | | 3.4.3.1 |
| Center of Gravity | (*) | | | |
| Accessibility | (*) | | | |
| Modularity | (*) | | | |
| Appearance | (*) | | | |
| (d) Form | | | | |
| Dimensions | (*) | | | 3.4.3.2 |
| Weight | (*) | | | |
| (e) System Grounding | (*) | | | 3.4.3.5 |
| (f) Power distribution/control panel | | | | |
| Interaction between controls and channels | (*) | | | 3.4.4 |
| (g) Power supplies | | | | |
| Redundancy | (*) | | (#) | 3.3 |
| Warning | (*) | (%) | | 3.3 |
| Automatic Switch over | (*) | (%) | (#) | 3.3 |
| Regulation | (*) | | | 3.4.7.1 |
| Ripple | (*) | | | 3.4.7.2 |
| CRT regulation | (*) | | | 3.4.7.3 |
| Power supply Protective circuitry | (*) | | | 3.4.7.4 |
| Indication | (*) | | | 3.4.7.5 |
| Short circuit protection | (*) | | | 3.4.7.6 |
| Recovery time after Power failure | (*) | (%) | (#) | 3.3 |
| (h) Map Album | (*) | | | 3.4.9 |
| (i) Replacing and positioning | (*) | | | 3.4.8.2.2 |

| | | | | | |
|---|---|---|---|---|---|
| (j) | Video map selector switch | (*) | (%) | (#) | 3.4.12 |
| (k) | Scanner tube protection | (*) | | | 3.4.8.4 |
| (l) | Video amplifiers | | | | |
| | Outputs | (*) | (%) | (#) | 3.4.8.5 |
| | Bandwidth | (*) | | | |
| | Rise time | (*) | | | |
| (m) | Video output signals | (*) | (%) | (#) | 3.4.8.6 |
| (n) | Accuracy | (*) | (%) | (#) | 3.4.8.9 |
| (o) | Map range | (*) | (%) | (#) | 3.4.8.10 |
| (p) | Resolution | (*) | (%) | (#) | 3.4.8.11.1 |
| (q) | Control | (*) | | | 3.4.10 |
| (r) | Video map distribution assembly | | | | |
| | 5 outputs (individual or simultaneous) | | | | 3.4.12 |
| | Isolation | (*) | (%) | | 3.4.12 |
| (s) | Meter and Test Panel | (*) | | | 3.4.8.13, 3.4.8.14 |
| (t) | AGC Circuits | | (%) | (#) | 3.4.8.7 |
| (u) | Alignment without use of special external test equipment | (*) | | (#) | 3.3 |
| (v) | Azimuth converter | (*) | | | 3.4.5 |
| (w) | Maintenance Selector Switch | (*) | | (#) | 3.4.11 |
| (x) | Trigger inputs from associated Radar Systems | (*) | | | 3.4.6 |

4.2.3 Radio Interference.- Radio interference (radiated and susceptibility conducted) tests shall be conducted in accordance with applicable portions of Specification MIL-STD-461 and paragraph 3.4.3.25.

## 5. PREPARATION FOR DELIVERY.

5.1 Packing.- Packing shall be in accordance with MIL-E-17555, Level A.

## 6. NOTES.

6.1 Note on Information Items.- The contents of this Section 6 are only for the information of the initiator of the procurement request and are not a part of the requirements of this specification. They are not contract requirements nor binding on either the Government or the contractor. In order for these terms to become a part of the resulting contract, they must be specifically incorporated in the schedule of the contract. Any reliance placed by the contractor on the information in these subparagraphs is wholly at the contractor's own risk.

6.2 Reliability Demonstration Option.- The contract schedule will state specifically whether the reliability demonstration (3.9) is to be conducted.

* * * * *

34717